

Nosocomial Outbreak of *Pantoea agglomerans* in a Pediatric Urgent Care Center

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Pantoea agglomerans is a Gram-negative bacterium whose isolates can be found in blood cultures and other secretions. This article described one outbreak of sepsis due to this bacterium in the pediatric urgent care center of a tertiary hospital, in Brasília, Federal District. This was a case-control study and it evaluated the risk factors for acquisition of nosocomial sepsis caused by *Pantoea agglomerans*. Six case-patients and 15 control-patients have been found. The risk factors were: vomiting in the internment and presence of solution compositions in the intravenous hydration therapy received in bigger number than 2 compositions. The transference tube used for the compositions was contaminated with *Pantoea agglomerans*, characterizing the outbreak with common source. The evolution of all the patients was favorable.

Key-Words: *Pantoea agglomerans*, pediatric, nosocomial outbreak.

Pantoea agglomerans is a bacterium of the family *Enterobacteriaceae* and it is a Gram-negative bacillus [1].

Pantoea agglomerans can cause disease in rare instances. It was found in wounds [2,3], blood and urine, as opportunistic pathogen [4].

Pantoea agglomerans, commonly found in plants, soil, water and food stuffs, although rarely recognized as an agent of endogenous nosocomial infections [5-7], can cause epidemics among hospitalized patients when associated with the use of contaminated intravenous products due to its ability to grow in commercial infusion fluids [8-10].

Outbreaks in hospital are of special concern, not only due to the increased susceptibility of the patients to infections and complications [11], but also because of the additional burden placed on health care resources and the potential disruption of hospital services [12].

The objective of this study was to describe a nosocomial outbreak of *Pantoea agglomerans* and to explore risk factors for infection.

Materials and Methods

Outbreak

The "Santa Lúcia" Hospital is a 240-bed tertiary care hospital situated in Brasília (DF). The pediatric emergency unit of this hospital ward has 8 beds available for hospitalization during more than 24 hours and 4 beds for hospitalization during less than 24 hours. The number of admitted children is on average 50 children per month. The most frequent procedures are intravenous rehydration and respiratory care.

On 04 August 2002, the infection control practitioner at Santa Lúcia Hospital was notified by the microbiology

laboratory that there were 3 children hospitalized with positive blood cultures for *Pantoea agglomerans* and that the isolation of the same ones was simultaneous.

In response to these cases and after big quarrel with pediatrics, an investigation initiated.

We suspended the hospitalization in the pediatric intensive care unit and whoever needed intravenous therapy would go to another ward of the hospital, constituted by individual apartments.

The Study Period

A case-control study of patients hospitalized since 25 July until 06 August 2002 was conducted to examine risk factors for the acquisition of nosocomial infection caused by *Pantoea agglomerans*. The period in which the study was carried out had to be in the interval in which the case-patients had been hospitalized in our service until the sepsis be diagnosed and the suspension of the hospitalization.

The institutional review board of the Santa Lúcia Hospital has approved this study.

Definition of Case and Control

The case-patients were defined as the children hospitalized with positive blood cultures for *Pantoea agglomerans*. The control-patients were defined as children who were hospitalized, in this service, from 25 July until 6 August 2002 and did not have *Pantoea agglomerans* isolated from blood cultures or clinical picture of sepsis.

Risk Factors

Medical records were abstracted using a standardized data collection form. Information collected included each patient's age, gender, date of admission, location within the hospital, symptoms (vomiting, diarrhea or fever), and results of blood, urine and stool cultures at the time of the onset of symptoms. Potential risk factors for acquiring *Pantoea agglomerans* infections, such: number of solution compositions in the venous hydration, preparation room and medications were also recorded.

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Environmental Investigation

The preparation and dilution room records from routine and storage methods were observed by the hospital's infection control practitioners. We discovered that the solution compositions in the intravenous hydration, that were pediatric prescriptions, were carried with only one tube called transference tube: Aminomix (Figure 1). The routine was to keep transference tube connected with NaCl 0.9% solution (Figure 2) on the table until the next composition.

When we interviewed the nurses about practices related to transference tube changes, we did not have records.

Microbiology

Sample cultures were obtained from transference tube, sterile water passed through transference tube and 0.9% sodium chloride solution that was opened in the table preparation.

An inoculum of 10 mL of 0.9% sodium chloride solution and 10 mL of sterile water passed through transference equipment was plated on thioglycolate, blood and MacConkey agar plates. Plates were incubated at 37°C and observed for a period of 24 hours [13].

The transference tube fragment was plated with Maki rolling technique, on the same agar plates.

All *Pantoea agglomerans* clinical isolates were identified with the automated-method VITEK-GNI cards (bioMérieux Vitek, Hazelwood, MO).

Cultures were performed in the microbiology laboratory of the EXAME laboratory.

Statistical Analysis

Data were compiled and frequency distributions calculated with Epi Info software (version 6; CDC, Atlanta). Case-patients were compared with control-patients using the chi-square test.

Results

Six patients were identified with positive blood cultures for *Pantoea agglomerans* and have been admitted with diagnosis of sepsis (case-patients), and out of 15 patients that had been admitted in the period of the study only 10 (66.6%) had received venous hydration and none had sepsis (control-patients).

The schedules of hospitalization, positive blood cultures and first composition of rehydration are in Figure 3.

All 6 case-patients infected with *Pantoea agglomerans* had gastrointestinal symptoms: vomiting (100% versus 40% of the control-patients, $p=0.003$) (Table 1). The presence of solution compositions in the intravenous rehydration received in bigger number than 2 compositions was a statistically significant predictor of *Pantoea agglomerans* sepsis (Table 1).

Gender and age did not differ significantly between case-patients and control-patients. Similar percentages of case-patients and control-patients had fever, diarrhea and days number of hospitalization.

Figure 1. Transference tube (Aminomix).



Figure 2. Transference tube connected with NaCl 0.9% solution.



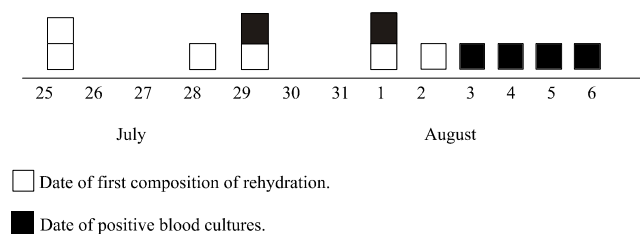
Microbiology laboratory recovered *Pantoea agglomerans* from samples of sterile water passed through transference tube and transference tube fragment.

We did not identify contaminated 0.9% sodium chloride solution.

All case-patients had received antimicrobials (ceftriaxone and amikacin) and the evolution of all the cases was favorable.

Table 1. Demographic and clinical characteristics of case-patients infected with *Pantoea agglomerans* and control-patients

Characteristics	Casep patients N/Total (%)	Control patients N/Total (%)	P χ^2
Median age,y (range)	4 (3-5)	3 (1-5)	.26
Male gender	3/6 (50)	7/15 (46.6)	.31
Symptom or sign			
Vomiting	6/6 (100)	11/15 (73.3)	.01
Diarrhea	5/6 (83)	6/15 (40)	.003
Fever	5/6 (83)	12/15 (80)	.38
Composition of rehydration	6/6 (100)	10/15 (66.6)	.004
Median n°, composition of rehydration (range)	10 (4-12)	2 (1-12)	.006
Median of total days of hospitalization before sepsis (range)	3 (1-5)	1 (1-6)	.08

Figure 3. *Pantoea agglomerans* infections by the dates. The schedules of first composition of rehydration and positive blood cultures.

Following recognition of the outbreak infection, control practices were reviewed and reinforced with nurses and staff. All facilities discontinued use of transference tube for solution compositions. Another routine was created and when necessary, as in parenteral feeding preparation, it would be used only one.

Discussion

Since the beginning of this investigation, we characterized it as a nosocomial outbreak [14]. The outbreak definition is a particular form of epidemic, where 2 or more cases occurred, related between itself in time or in space, reaching a specific group of people, configuring clearly an excess of cases [15].

This outbreak had only 1 infectious agent, therefore 1 common source [16]. The children had been exposed to a common source of the *Pantoea agglomerans*, allowing the cases to appear in fast succession and in a short period of time.

We identified extrinsically contaminated transference tube used for rehydration as the source of this outbreak. A point source was confirmed after microbiology laboratory demonstrated strain relatedness among all case-

patient isolates tested and *Pantoea agglomerans* isolates recovered from transference tube. After removal of the implicated product, no further cases were reported in the hospital.

Nosocomial outbreaks of *Pantoea agglomerans* rarely have been reported in the literature [5-7]. The results of this investigation suggested that the source of this outbreak was a transference tube and *Pantoea agglomerans* may have contaminated through the hands of staff members.

As a result of the outbreak, new policies were instituted in the preparation room aiming to improve cleaning and disinfection of the equipments and the environment. An alcohol-based hand sanitizer was placed in all inpatient units for use by staff, providing patient care. In addition, institution wide educational interventions emphasizing hand hygiene for the prevention of nosocomial diseases were implemented and, as part of this, the hospital staff was reminded that eating and drinking in patient care areas is prohibited. Increased emphasis on hand hygiene is an important measure of prevention. Additional resources should be targeted at optimizing and sustaining good hand hygiene among hospital staff.

This analysis implicated a transference tube used by the hospital as the source of an outbreak of nosocomial *Pantoea agglomerans* and this outbreak illustrated the importance of active hospital-based surveillance, including a close relationship between the infection control team and microbiology laboratory.

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